Thermal activities
(Update)

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EVO meeting - 10.11.2010

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Outline

Thermal mockup

- Status since Valencia (New parts availiable!)

CO_2 Cooling Plant

- (Example) ATLAS End Cap

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THERMAL MOCKUP

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Mock-up: Air cooling (Valencia meeting)

Cooling	beam pipe temperature	Study impact of beam pipe temperature on PXD cooling	1,6 *Thermal Issues*	Carlos Marinas
Cooling	Air Cooling	Engineer air cooling (together with SVD, common dry volume) Valencia and Karlsruhe & Vienna	1,6 *Thermal Issues*	Carlos Marinas
Cooling	mockup	Valencia to design small cooling mockup	1,6 *Thermal Issues*	Carlos Marinas
Cooling	Air Cooling	Test performance of carbon tubes (mass flow,vibrations)	1,6 *Thermal Issues*	Carlos Marinas

- Working on a PXD mock-up inside a polycarbonate cylinder (thermal images)
- Al-beam pipe with cooling (15ºC)
- Transparent dummy ladders to have access to the inner layer and study vibrations
- Support structures similar to the final ones but with mono-phase cooling (CO_2 could be implemented if needed)
- Carbon tubes can be added
- Ladders: Samples with integrated resistors

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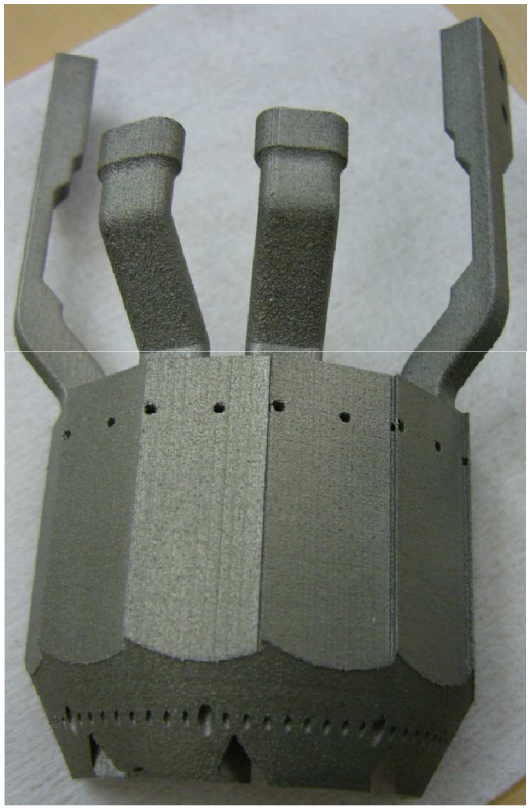
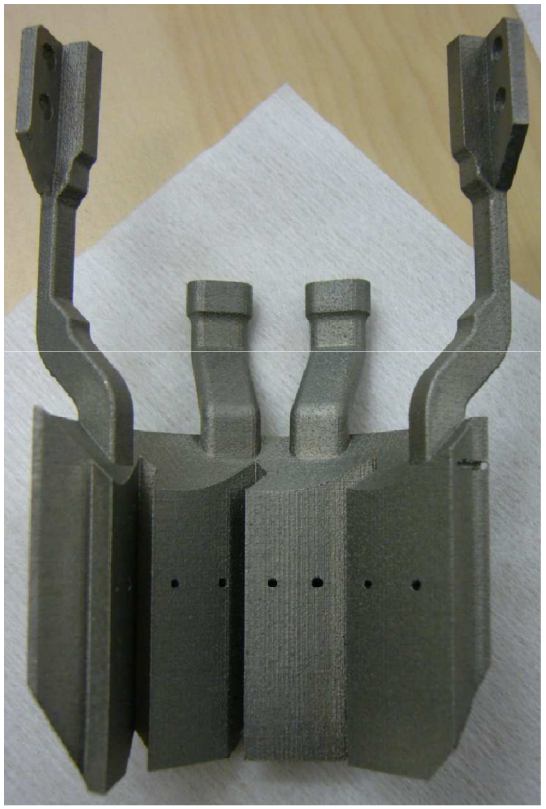
Cooling blocks

Stainless steel 3D laser sintering



The pieces are a bit thicker to recover the right dimensions after polishing the surfaces



Two holes to accomodate *old* and *new* samples

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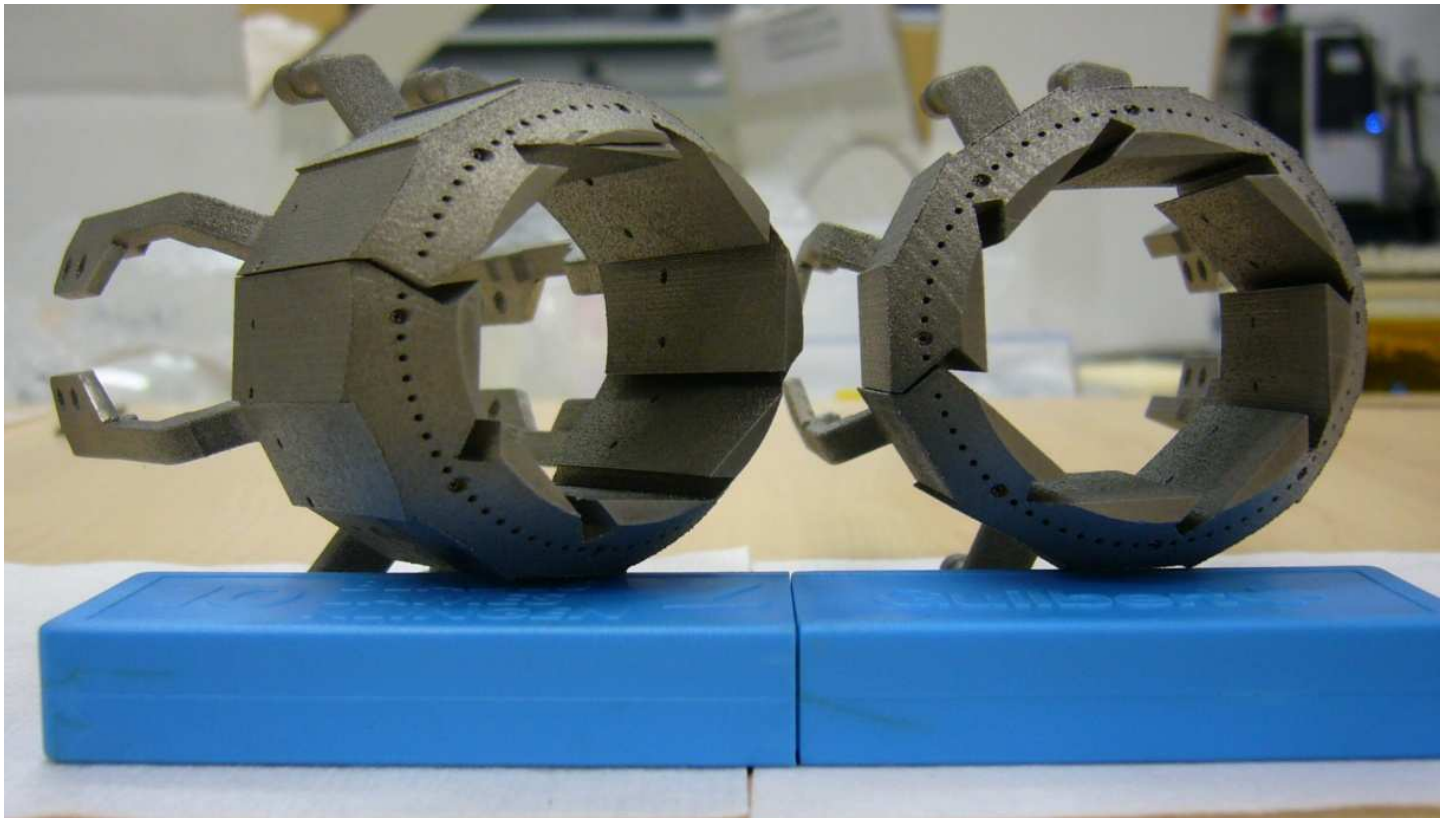
Cooling blocks

The support structures will be populated with dummies (made in polycarbonate) and two silicon samples with resistors integrated



(Not tested yet!)

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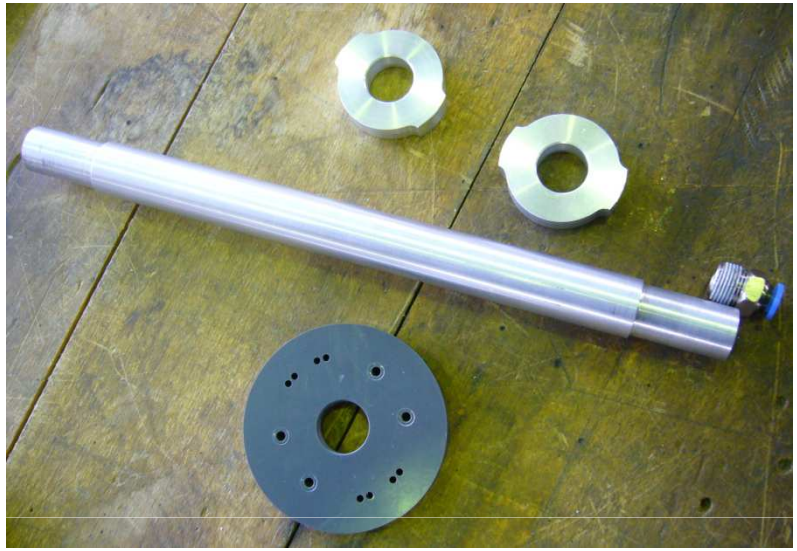
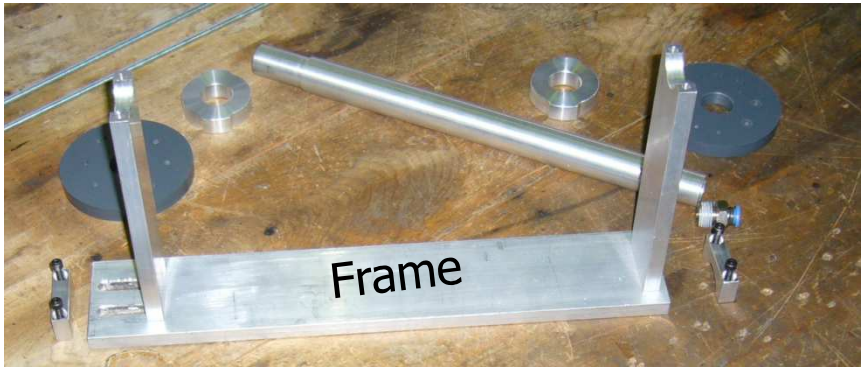
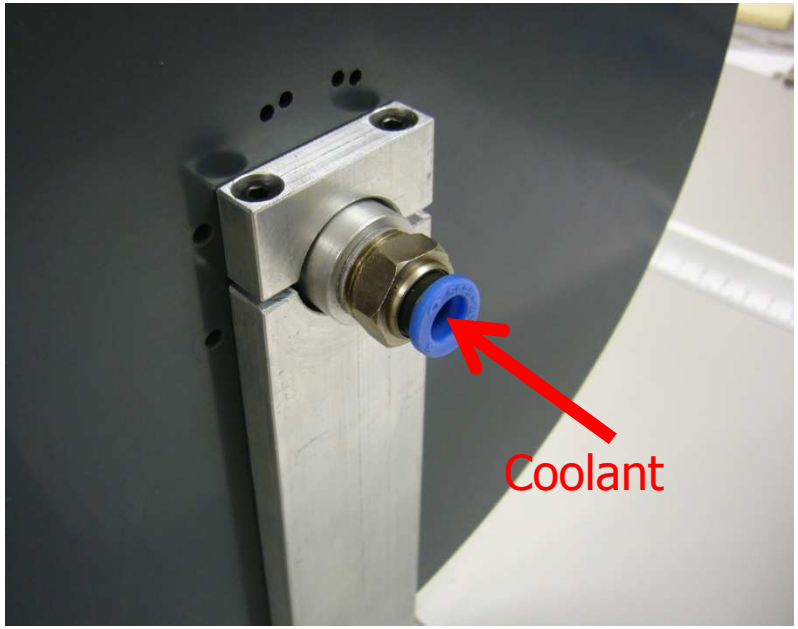
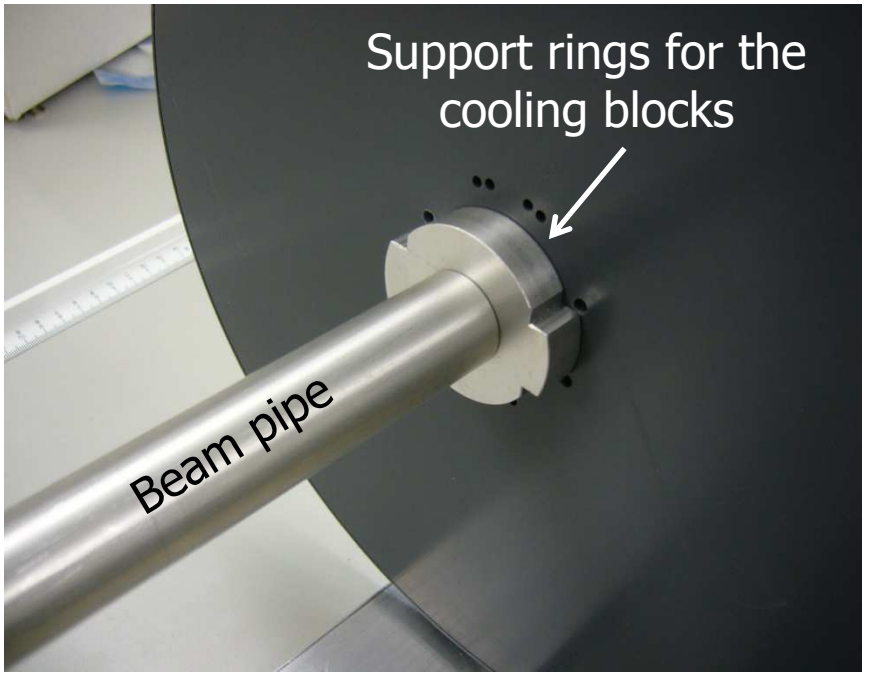
Beam pipe









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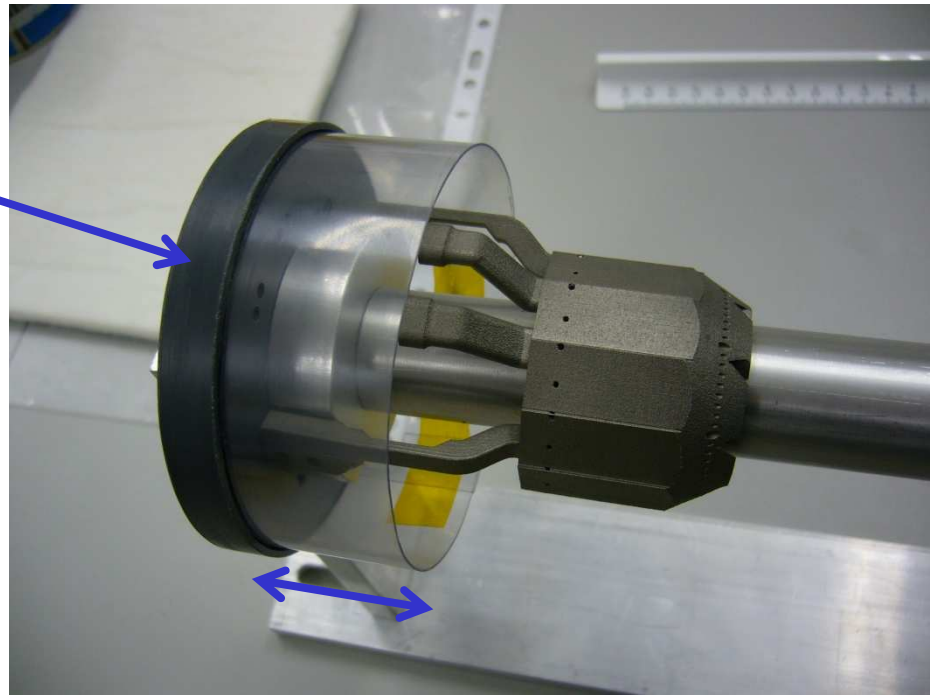
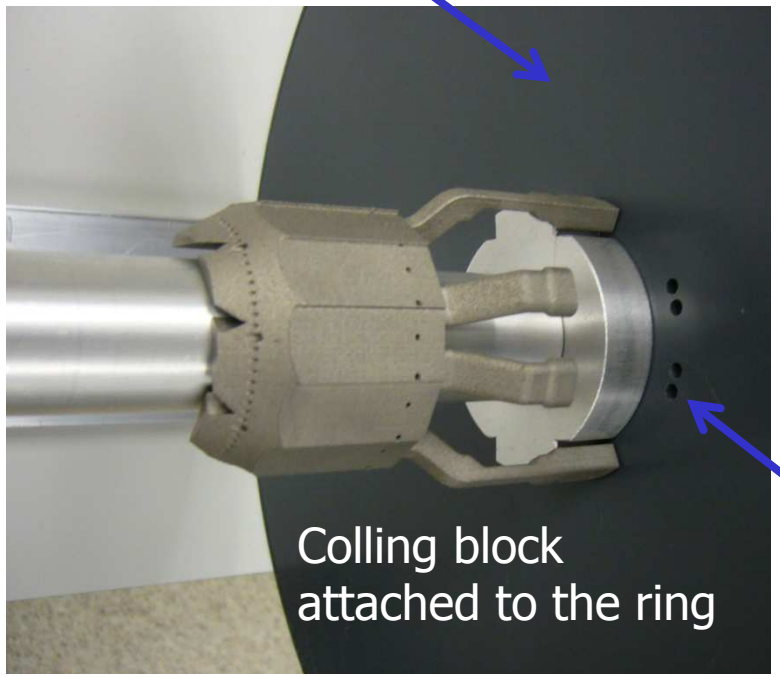
Support rings and working volume

Two PVC "endcaps" will define the working volume: PXD standalone or PXD+SVD





The polycarbonate screen will be extended to cover the full volume

Holes for the services (air and coolant)

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CO_2 COOLING PLANT

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ATLAS EC Petal layout

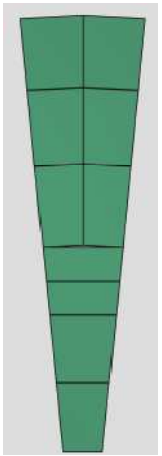
Cooling System is one of the key points for ID operation

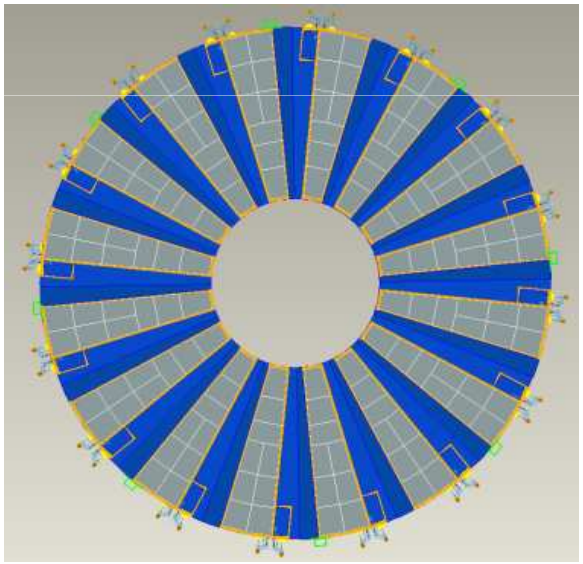
Heat density is 4-7 times higher than the current SCT module

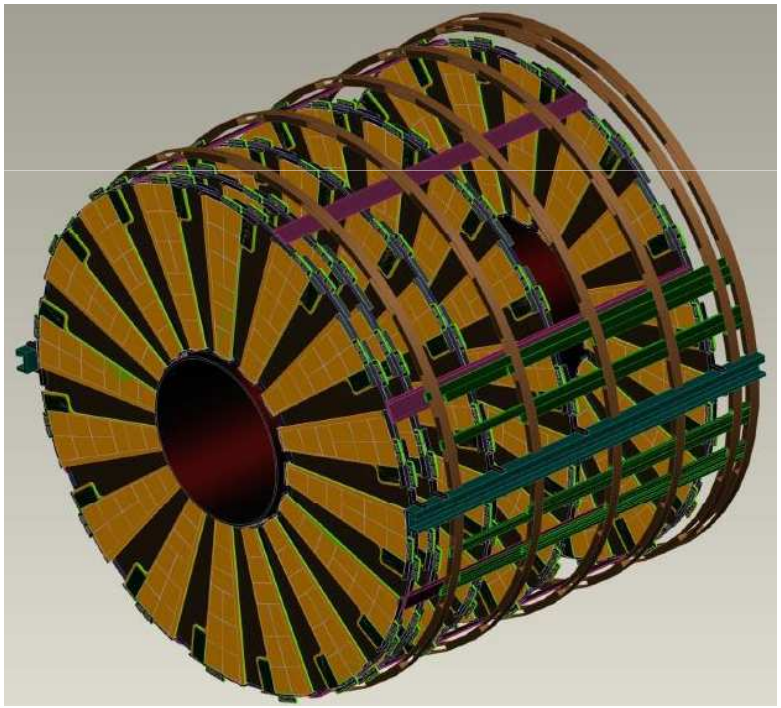
Detector thermal runaway impose to operate the silicon wafer below -20ºC

$$T_{sensor} = T_{coolant} + \Delta T_{Heat\_Path}$$

→ Coolant: Less than -30 ºC is considered for the pipe temperature (CO_2)







Sensors assembled in petals, petals on disks, and disks in the endcap support structure

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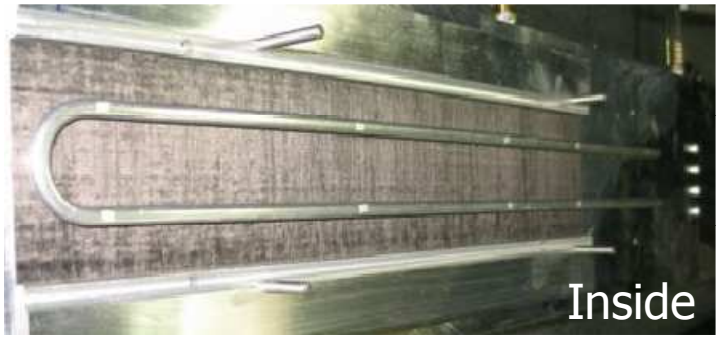
- CO_2 cooling plant



Fully operational!

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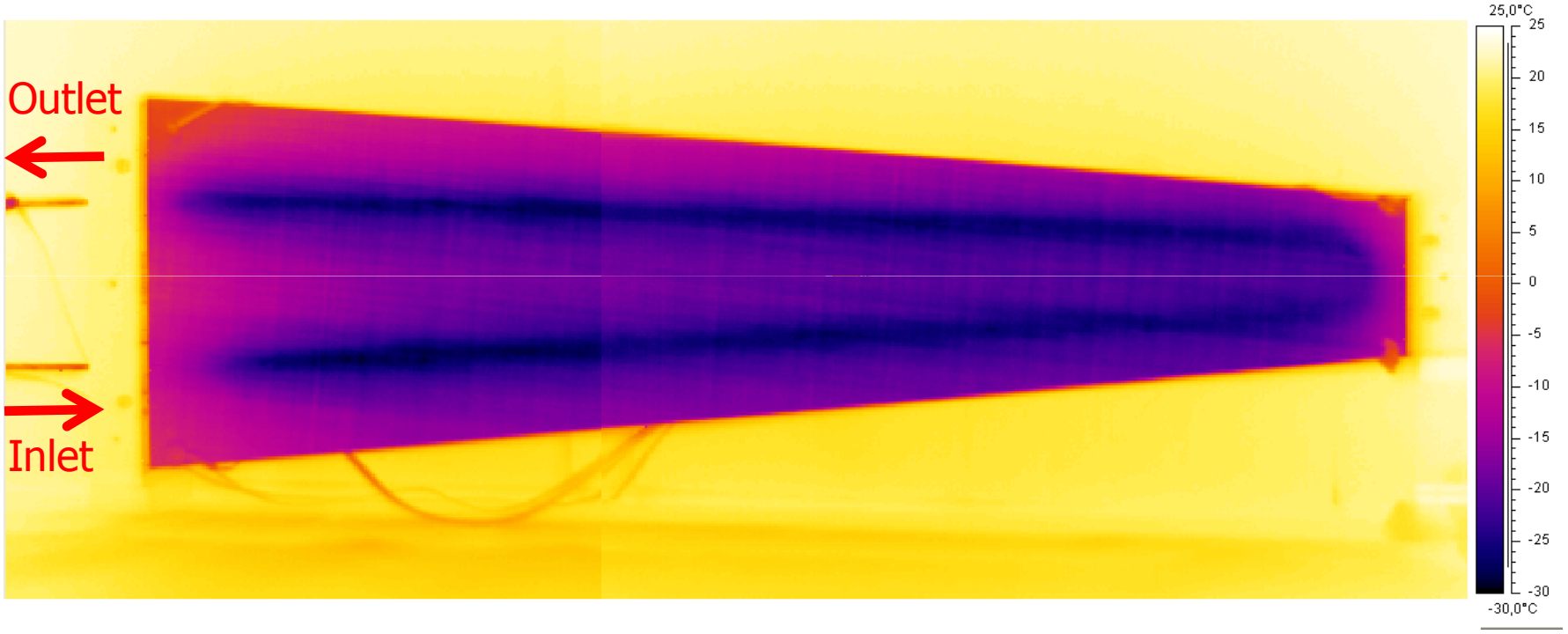
Thermal image



The CO_2 worked well until the desired temperature: ~ -25ºC

Further tests expected in a near future (minimal temperature)

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